

What is claimed is:

1           1. A multi-channel communication system for data communication comprising:  
2           a first station;  
3           a plurality of second stations; and  
4           medium access control means for controlling operation of said data communication via one  
5           or more data links and control links between said first station and said second stations, said  
6           operation comprising:  
7                 transmitting, from said second stations, one or more request packets to said first station  
8                 via said one or more control links, said one or more request packets including a preamble code  
9                 and a padding code,  
10                transmitting, from said first station, one or more code assignment commands to one or  
11                more of said second stations via said one or more control links, and  
12                transmitting, based on said one or more code assignment commands, one or more data  
13           packets from said one or more of said second stations to said first station via said one or more data  
14           links.

1           2. The system of claim 1, wherein said communication system is a wireless system, said  
2           first station is a base station and said second stations are mobile stations.

1           3. The system of claim 1, wherein said padding code comprises a dummy data code and  
2           an error detection code for collision detection by said first station.

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4. The system of claim 1, wherein said padding code is selected based on a random  
selection of said preamble code.

1           5. The system of claim 1, wherein a predetermined number of said preamble codes  
2           transmitted by said second stations is processed by said first station.

1           6. The system of claim 1, wherein said one of said one of more second stations spreads  
2           and modulates said data packet by a data scrambling code selected from among scrambling codes  
3            $s_k$  where  $k=0\dots n$ , and said data scrambling code is randomly selected as follows:

$$k = j \times m + r$$

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5           where  $j$  represents a sequence number that indicates a particular time-offset in a number of time-  
6           offsets in a predetermined frame period,  $m$  represents a number of said code assignment  
7           commands, and  $r$  represents a sequence number that indicates in a sequence of said code  
8           assignment commands a position of a code assignment command in said sequence which contains  
9           a preamble code number  $i$  transmitted by said mobile station in said particular time-offset.

1 7. The system of claim 1, wherein a first one of said second stations performs a random  
2 access attempt by transmitting a first one of said one or more request packets including a preamble  
3 code  $p_i$  and a padding code encoded by a scrambling code  $S_i$  and if said first station correctly  
4 receives said preamble code  $P_i$  and said padding code without error, said first station sends a code  
5 assignment command indicating that said random access attempt of said first one of said second  
6 stations is successful.

7 8. The system of claim 7, wherein said first one of said second stations transmits said  
8 preamble code  $p_i$  in a  $j^{th}$  time offset of a frame and detects among said one or more code  
9 assignment commands, a code assignment command containing said preamble code  $p_i$ , said first  
10 one of said second stations transmits its one of said data packets to said first station while  
employing a data scrambling code  $s_k$ , where  $s_k$  is selected via the equation:

$$k = j \times m + r$$

1 where  $j$  represents a sequence number that indicates a particular time-offset in a number of time-  
2 offsets in a predetermined period of said frame,  $m$  represents a number of said code assignment  
3 commands, and  $r$  represents a sequence number that indicates in the CAC sequence the position  
4 of the CAC which contains the preamble code  $P_i$ .

1 9. The system of claim 1, wherein if said first station determines that there are greater than  
2  $m$  of said request packets correctly received from said second stations, said first station transmits

3 said code assignment commands to authorize only  $m$  of said second stations to transmit said data  
4 packets to said first station.

10. The system of claim 7, wherein selection of said scrambling code  $s_i$  is determined by  
2 said preamble code  $p_i$  in accordance with a one-to-one mapping of function  $g:P \rightarrow \mathcal{P}$ :

$$g(p_i) = s_i, i = 0 \dots 15$$

4 where  $P$  represents the set of all preamble codes and  $\mathcal{P}$  represents the set of all scrambling codes.

11. A multi-channel communication system for data communication comprising:

a first station;

a plurality of second stations; and

medium access control means for controlling operation of said data communication via a  
plurality of data links, a plurality of forward control links, and a single reverse control link  
between said first station and said second stations, said operation comprising:

transmitting, from said second stations, one or more request packets to said first station  
via said plurality of forward control links, each of said one or more request packets including a  
preamble code and a padding code,

transmitting, from said first station, one or more code assignment commands to one or  
more of said second stations via said reverse control link, and

12 transmitting, based on said one or more code assignment commands, one or more data  
13 packets from said one or more of said second stations to said first station via said plurality of data  
14 links.

1 12. The system of claim 11, wherein said communication system is a wireless system, said  
2 first station is a base station and said second stations are mobile stations.

1 13. The apparatus of claim 11, wherein said padding code comprises a dummy data code  
2 and an error detection code for collision detection by said first station.

1 14. The apparatus of claim 11, wherein said padding code is selected based on a random  
2 selection of said preamble code.

3 15. The system of claim 11, wherein a predetermined number of said preamble codes  
4 transmitted by said at least one second station is processed by said first station.

1 16. The system of claim 11, wherein one of said one or more of said second stations  
2 spreads and modulates said data packet by a data scrambling code, and said data scrambling code  
3 as represented by  $s_k$  is randomly selected as follows:

$$k = j \times m + r$$

5 where  $j$  represents a sequence number that indicates a particular time-offset in a number of time-  
6 offsets in a predetermined frame period,  $m$  represents a number of said code assignment  
7 commands, and  $r$  represents a sequence number that indicates in a sequence of said code  
8 assignment commands a position of a code assignment command in said sequence which contains  
9 a preamble code number  $i$  transmitted by said mobile station in said particular time-offset.

1 17. The system of claim 11, wherein a first one of said second stations performs a random  
2 access attempt by transmitting a first one of said one or more request packets including a preamble  
3 code  $p_i$  and a padding code encoded by a scrambling code  $S_i$  and said first station correctly  
4 receives said preamble code  $P_i$  and said padding code without error, said first station sends a code  
5 assignment command indicating that said random access attempt of said first one of said second  
6 stations is successful.

1 18. The system of claim 17, wherein said first one of said second stations transmits said  
2 preamble code  $p_i$  in a  $j^{th}$  time offset of a frame and detects among said one or more code  
3 assignment commands, a code assignment command containing said preamble code  $p_i$ , said first  
4 one of said second stations transmits its one of said data packets to said first station while  
5 employing a data scrambling code  $s_k$ , where  $s_k$  is selected via the equation:

$$k = j \times m + r$$

7 where  $j$  represents a sequence number that indicates a particular time-offset in a number of time-  
8 offsets in a predetermined period of said frame,  $m$  represents a number of said code assignment  
9 commands, and  $r$  represents a sequence number that indicates in the CAC sequence the position  
10 of the CAC which contains the preamble code  $P_i$ .

1 19. The system of claim 11, wherein if said first station determines that there are greater  
2 than  $m$  of said request packets correctly received from said second stations, said first station  
3 transmits said code assignment commands to authorize only  $m$  of said second stations to transmit  
4 said data packets to said first station.

5 20. The system of claim 17, wherein selection of said scrambling code  $s_i$  is determined  
6 by said preamble code  $p_i$  in accordance with a one-to-one mapping of function  $g:P \rightarrow \mathcal{P}$ :

$$g(p_i) = s_i, i = 0..15$$

7 where  $P$  represents the set of all preamble codes and  $\mathcal{P}$  represents the set of all scrambling codes.

1 21. A multi-channel communication system for data communication comprising:

2 a first station;

3 a plurality of second stations; and

4 medium access control means for controlling operation of said data communication via a  
5 plurality of data links, a plurality of reverse control links, and a forward control link between said  
6 first station and said second stations, said operation comprising:

7 transmitting, from said second stations, one or more request packets to said first station  
8 via said plurality of reverse control links, each of said one or more request packets including a  
9 preamble code and a padding code which is encoded by a random access scrambling code,

10 transmitting, from said first station, one or more code assignment commands encoded by  
11 a channelization code to one or more of said second stations via said forward control link, and

12 transmitting, based on said one or more code assignment commands, one or more data  
13 packets encoded by data scrambling codes from said one or more of said second stations to said  
14 first station via said plurality of data links.

22. The system of claim 21, wherein said communication system is a wireless system, said  
2 first station is a base station and said second stations are mobile stations.

1 23. The system of claim 21, wherein said padding code comprises a dummy data code and  
2 an error detection code for collision detection by said first station.

1 24. The system of claim 21, wherein said random access scrambling code is selected based  
2 on a random selection of said preamble code.



1           25. The system of claim 21, wherein a predetermined number of said preamble codes  
2 transmitted by said second stations is processed by said first station.

1           26. The system of claim 21, wherein a code  $s_k$  of said data scrambling codes is randomly  
2 selected as follows:

$$k = j \times m + r$$

3  
4 where  $j$  represents a sequence number that indicates a particular time-offset in a number of time-  
5 offsets in a predetermine frame period,  $m$  represents a number of said code assignment commands,  
6 and  $r$  represents a sequence number that indicates in a sequence of said code assignment commands  
7 a position of a code assignment command in said sequence which contains a preamble code  
8 number  $i$  transmitted by said mobile station in said particular time-offset.

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assignment commands, a code assignment command containing said preamble code  $p_i$ , said first one of said second stations transmits its one of said data packets to said first station while employing a data scrambling code  $s_k$ , where  $s_k$  is selected via the equation:

$$k = j \times m + r$$

where  $j$  represents a sequence number that indicates a particular time-offset in a number of time-offsets in a predetermined period of said frame,  $m$  represents a number of said code assignment commands, and  $r$  represents a sequence number that indicates in the CAC sequence the position of the CAC which contains the preamble code  $P_i$ .

29. The system of claim 21, wherein if said first station determines that there are greater than  $m$  of said request packets correctly received from said second stations, said first station transmits said code assignment commands to authorize only  $m$  of said second stations to transmit said data packets to said first station.

30. The system of claim 27, wherein selection of said scrambling code  $s_i$  is determined by said preamble code in accordance with a one-to-one mapping of function  $g: P \rightarrow \Psi$ :

$$g(p_i) = s_i, i = 0..15$$

where  $P$  represents the set of all preamble codes and  $\Psi$  represents the set of all scrambling codes.